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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/423,981 | 02/18/2000 | SHOGO MURAMATSU | 991304 | 7398 |

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| EXAMINER |
|---|
| SAVAGE, JASON L |

| ART UNIT | PAPER NUMBER |
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| 1775 | |

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Please find below and/or attached an Office communication concerning this application or proceeding.

mk-24

| Advisory Action | Application N . | Applicant(s) | |
|---|---|---|---|
| | 09/423,981 | MURAMATSU ET AL. | |
| | Examin r | Art Unit | |
| | Jason L Savage | 1775 | |

*--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

THE REPLY FILED FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE. Therefore, further action by the applicant is required to avoid abandonment of this application. A proper reply to a final rejection under 37 CFR 1.113 may only be either: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114.

PERIOD FOR REPLY [check either a) or b)]

a) ☒ The period for reply expires 5 months from the mailing date of the final rejection.

b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection. ONLY CHECK THIS BOX WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

1. ☐ A Notice of Appeal was filed on _____. Appellant's Brief must be filed within the period set forth in 37 CFR 1.192(a), or any extension thereof (37 CFR 1.191(d)), to avoid dismissal of the appeal.

2. ☐ The proposed amendment(s) will not be entered because:

   (a) ☐ they raise new issues that would require further consideration and/or search (see NOTE below);

   (b) ☐ they raise the issue of new matter (see Note below);

   (c) ☐ they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

   (d) ☐ they present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____.

3. ☒ Applicant's reply has overcome the following rejection(s): See Continuation Sheet.

4. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

5. ☒ The a)☐ affidavit, b)☐ exhibit, or c)☒ request for reconsideration has been considered but does NOT place the application in condition for allowance because: *See Continuation Sheet*.

6. ☐ The affidavit or exhibit will NOT be considered because it is not directed SOLELY to issues which were newly raised by the Examiner in the final rejection.

7. ☒ For purposes of Appeal, the proposed amendment(s) a)☐ will not be entered or b)☒ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

   The status of the claim(s) is (or will be) as follows:

   Claim(s) allowed: _____.

   Claim(s) objected to: _____.

   Claim(s) rejected: *1-4 and 6*.

   Claim(s) withdrawn from consideration: _____.

8. ☐ The proposed drawing correction filed on _____ is a)☐ approved or b)☐ disapproved by the Examiner.

9. ☐ Note the attached Information Disclosure Statement(s)( PTO-1449) Paper No(s). _____.

10. ☐ Other: _____

JOHN J. ZIMMERMAN
PRIMARY EXAMINER

Continuation of 3. Applicant's reply has overcome the following rejection(s): The rejections to claims 1-4 and 6 under 35 USC 112 have been overcome.

Continuation of 5. does NOT place the application in condition for allowance because: On page 7 of the Amendment, Applicant argues that Mori does not teach or suggest that the invention have a particle size greater than 10 micrometers. Applicant argues that the particle size contained in the comparative example is irrelevant since the comparative example uses a casting method rather than a spraying method. While it is acknowledged that the comparative example uses casting, the teaching is not irrelevant. As was stated previously, the disclosures in a reference must be evaluated even though the art teachings relied upon are phrased in terms of being unsatisfactory for the intended purpose. Mori teaches forming a member coated with an Al-Si alloy having particle sizes greater than 10 micrometers, thus, while not being a preferred embodiment, the formation of coated members having some particles in the claimed size range would have been an obvious embodiment to one of ordinary skill.

In support of Applicant's position that Mori does not teach particle sizes greater than 10 microns, Applicant cites the "Application of Wear Resistant Flame Spraying Technique to Automotive Parts" article. While the article may teach submicron sized particles such as stated b Applicant, it does not change the fact that the Mori patent teaches a preferred particle size range of between 0.01 to less than 10 micrometeres (col. 2, ln. 27-37) as well as the 20 micrometer particle size. Applicant's citing of the related article does not change what is clearly disclosed in the Mori patent.

On page 8 of the Amendment, Applicant argues against the Examiner's assertion that materials having the claimed particle sizes have been made since Mori teaches the materials having the large particle sizes are produced by casting and not spraying. In interest of clarifying the rejection, this line of reasoning has been removed from the rejection. The fact that the large particle sizes were formed by a different method does not change that producing materials having large particles would have been obvious to one of ordinary skill.

On pages 9-10 of the Amendment, Applicant emphasizes that the inclusion of relatively coarse Si particles of more than 10 micrometers contributes to enhance both wear resistance and seizure resistance with the materials of the present invention. As was prionted out in th previous Office Action, this argument is not commensurate in scope with the specification as there appears to be no teaching in the Application that particles of this size have the stated effect on the materials properties. As was also stated in the previous Office Action, the mere assertion by Applicant that the properties are enhanced is not considered proof.

In order to overcome Applicant's burden of showing the products of the present invention are patentably distinct over the products of the prior art, Applicant asserts that the inventive products differ from those in the prior art in terms of structure as indicated previously and thu one or more properties and that said differences produce unexpected or suprising results. First, it is unclear as to what particular structur difference Applicant is referring, the Examiner presumes Applicant intends the limitation that a least one particle have a size greater 10 micrometers. As was stated in the rejection and the arguments above, such the inclusion of large particles would have been obvious. Second, just because the structure may be slightly different does not mean that the material would exhibit unexpected or suprising results Applicant has still not met the burden of showing that the claimed material is patentably distinct from the prior art.

As support of the unexpected or suprising results, Applicant refers to the Declaration filed by Mr. Muramatsu wherein he states that the seizue load of the flame-sprayed aluminum was 40 kg/cm3 and that of the casted aluminum alloy was 60kg/cm3. The relevance of this declaration to the issue of showing how the claimed material is patentably distinct from the prior art material of Mori is not understood. Applicant still has not shown how the inventive material produces unexpected or suprising results when compared to the closest prior art taught by Mori.

On pages 10-11 of the Amendment, Applicant also argues that the invention is formed by HVOF which produces a special morphology as opposed to being thermally sprayed as taught by Mori. As was stated in the previous Office Action, it would have been obvious to have used any known method of thermally spraying, including HVOF and while Applicant only discloses that the claimed morphology can be formed by an HVOF process, it does not teach that other thermal spraying processes could not also be capable of forming the same morphology. In fact, Applicant states that various flame spraying methods can be employed (p. 5, lines 28-29 of the Specification). Furthermore, Applicant has failed to establish that the inventive product is patentably distince from the product of Mori formed by plasma spraying.

On page 10, Applicant compares the morphology of Fig 1(B) of Mori with the morphology of the present invention. However, as Applicant stated, Fig 1(B) is the morphology of a cast product, not the flame sprayed product. Applicant goes on to conclude from this comparison that the microstructure of the material formed by HVOF is different from that formed by plasma spraying. How Applicant was able to arriv at this conlusion is not understood by the Examiner since, as Applicant demonstrated, the morphology of the particles formed by casting i not the same as the morphology formed by spraying.

On page 11, Applicant refers to the technical paper "Development of HVOF Sprayed Aluminum Alloy Engine Bearings" as evidence that bearing materials formed by HVOF have microstructures that cannot be achieved using the conventional casting route. Once again, Applicant is comparing casting to HVOF and not preferred method of thermal spraying taught by Mori. Furthermore, it was noted that the microstructure of the particles in Figure 4 of the technical paper bears a good resemblance to Fig 1(A) of Mori depicting the microstructur of the thermally sprayed material.

On pages 11-12, Applicant argues that the patents of Mori and Kawagoe provide no suggestion to motive one of ordinary skill to combine their teachings. As was stated in the previous Office Action, it is well known in the art to roughen substrate surfaces in order to improve the adhesion of an overlying coating. Kawagoe is provided to shaw that the use of such a roughening technique in the art of forming a flame sprayed coating is known. It would have been within the level of one of ordinary skill in the art to have recognized that is may be beneficial to employ such a roughening technique for the flamed sprayed coating of Mori in order to increase the adhesion between the substrate and the coating.

On page 12, Applicant requests reconsideration of the rejection in view of Mori in view of Kawagoe further in view of Wilkoz in light of the previous arguments made by Applicant. However, since arguments by Applicant were not found to be persuasive enough to drop the rejections, the rejection in view of Mori in view of Kawagoe further in view of Wilkoz has been maintained as well.

Continuation of 7. Explaination of how the newly amended claims would be rejected:

Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mori el al. (US 6,090,497) in view of Kawagoe et al. (US 5,864,745).

Mori teaches a coated member wherein the coating is a wear resistant Al-Si alloy having a content of Si from 26-80 weight % an further containing fine Si particles from 0.01 to 10 μm dispersed therein (col. 2, ln. 27-37). The wear resistant coating may also contain additional materials such a 0.05-10%Mg, 0.5-10%Cu, 0.1-20% Sn, and between 0.05-15% of Mn, Fe, and/or Ni (col. 3, ln. 1-8; col. 3, ln. 65 – col. 4, ln. 9). Mori further teaches that the wear resistant coating which is formed by thermally spraying is suitable for compressor parts such as in automobiles (col. 5, ln. 44 – col. 6, ln. 3).

Regarding the limitation that the ratio of the short-diameter to long diameter Si particles is 1/3 or more, the particles in Figure 1 o Mori appear to fit well within the claimed ratio as most of the particles appear to be more rounded in shape.

Regarding the limitation that the alloy contain some particles having a size greater than 10 μm, Mori teaches the particles in the comparative example are as large as 20 μm (col. 9, ln. 24-25) and that particle sizes greater than 10 μm are undesirable because it causes unfavorable acceleration of abrasion of a counter material (col. 4, ln. 20-22). Although Mori teaches that particle sizes within the claimed range are not desirable, all the disclosures in a reference must be evaluated for what they fairly teach one of ordinary skill in the art even though the art teachings relied upon are phrased in terms of a non-preferred embodiment or even as being unsatisfactory for the intended purpose, In re Boe, 148 USPQ 507 (CCPA 1966); In re Smith, 65 USPQ 167 (CCPA 1945); In re Nehrenberg, 126 USPQ 383 (CCPA 1960); In re Watanabe, 137 USPQ 350 (CCPA 1963). Furthermore, the claim does not require that all of the particles are greater than 10 μm, Applicant has failed to show how having a limited number of particles greater than 10 μm in size would provide a patentable distinction over the prior art.

Regarding the limitation that the flame-spraying method used is HVOF, HVOF is a well known method of thermal-spraying. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have used any known method of thermal spraying, including HVOF to have applied the aluminum-alloy coating. Furthermore, the HVOF process does not provide a distinction ove other flame-spraying methods since Applicant admits on page 5, lines 28-29 of the Specification that various flame-spraying methods can be employed to form the claimed aluminum-alloy. Finally, HVOF is a process limitation, when there is a substantially similar product, as i the applied prior art, the burden of proof is shifted to the applicant to establish that their product is patentably distinct not the examiner to show that same process of making, see In re Brown, 173 U.S.P.Q. 685, and In re Fessmann, 180 U.S.P.Q. 324.

Mori does not teach the roughening of the substrate surface; however, it is well known in the art to roughen the substrate surface in order to improve the adhesion of the overlying coating. Kawagoe teaches a flame sprayed aluminum silicon alloy (col. 13, ln. 5-7) as well as shot blasting the substrate to roughen the surface before applying the wear resistant coating (col. 15, ln. 59 – col. 6, ln. 31). It would have been obvious to one of ordinary skill in the art at the time of the invention to have roughened the surface of the substrate prio to applying the wear resistant coating of Mori in order to have increased the adhesion between the substrate and the coating.

Regarding the limitation that the flame-sprayed aluminum alloy has adhesive strength of film higher than that of a flame-sprayed Ni film, such an adhesive strength would have been inherent. The Patent and Trademark Office can require Applicant to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on Applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, In re Best, Bolton, and Shaw, 195 U.S.P.Q. 431 (CCPA 1977).

Regarding the material ranges in claim 3, although the weight percentages of the additional materials are not within the exact same ranges claimed by Applicant, all of the material ranges taught by Mori overlap the material ranges claimed by Applicant which obviates claim 3.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mori et al. (US 6,090,497) in view of Kawagoe et al. (US 5,864,745) as applied to claims 1-4, and in further view of Wilkosz et al. (US 5,655,432).

Mori and Kawagoe teach what is set forth above but it does not teach a layer covering the outer surface of the wear resistant coating. However, it is known in the art to coat wear resistant components with lubricating coatings in order to improve the seizure resistance during dry conditions.

Wilkosz teaches an aluminum-silicon swash-plate compressor which has a coating comprising a PTFE resin and lubricating particles such as carbon and MoS2 dispersed therein (col. 3, ln. 38-60). This coating reduces the friction of the swash-plate and increases its durability (col. 3, ln. 5-8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the lubricating or friction reducing coatings of Wilkosz on the exterior surface of the coating taught by Mori as modified by Kawagoe in order to have improved the seizure resistance and to increase the durability of the swash-plate compressor, particularly during dry conditions.